

# Global Derivative-free Optimization

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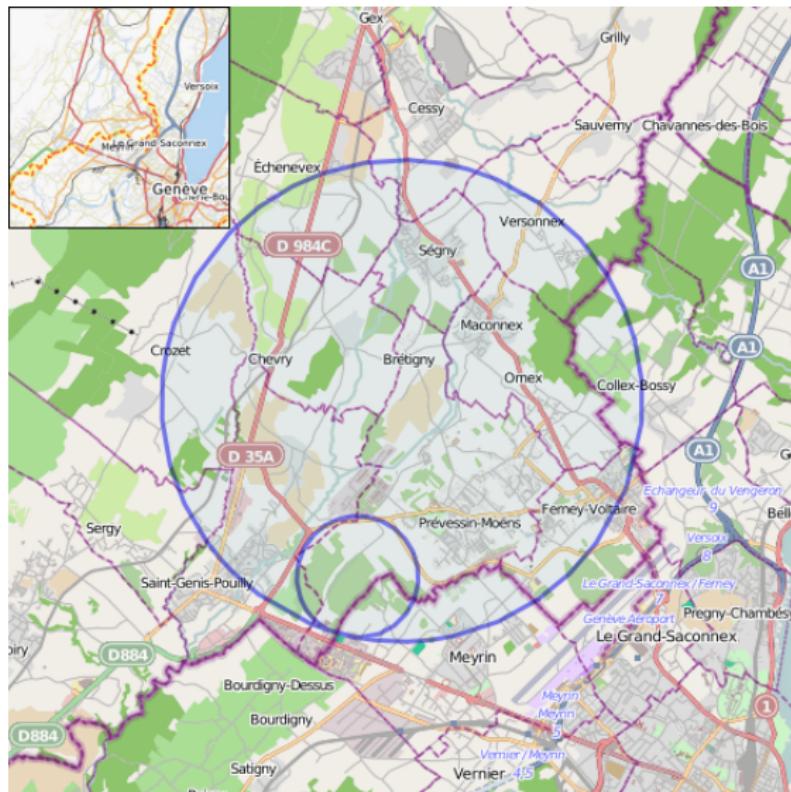
## Problem setup

$$\begin{aligned} & \underset{x}{\text{minimize}} \quad S(x) \\ & \text{subject to: } x \in \mathcal{D} \subset \mathbb{R}^n \end{aligned}$$

when the derivatives of the objective  $S$  are not available.

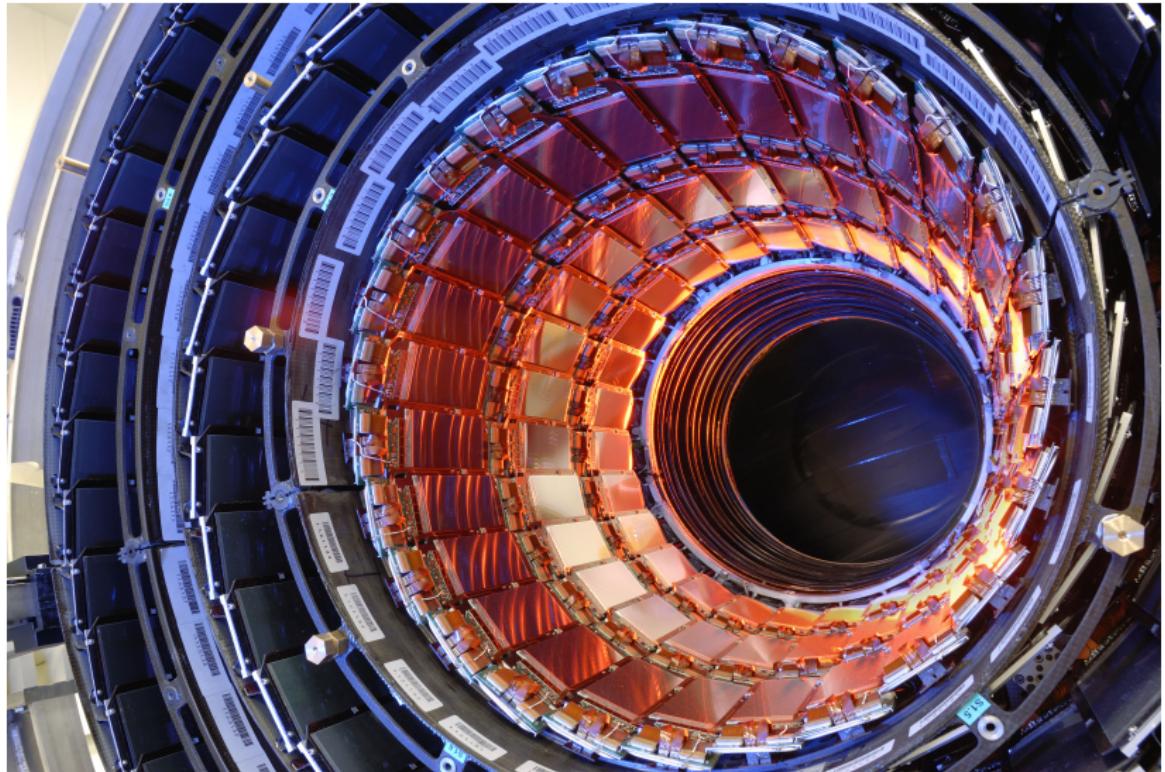


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LHC: \$4.75B to build; \$1B to operate; \$0.25B computation

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Mira: \$180M to build; \$4M to operate; 3.9 Megawatts

## Simple approaches

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- ▶ Evolutionary Algorithms



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- + Get to use (more developed) local optimization routines.
  - ▶ least-squares objectives, nonsmooth objectives, (un)relaxable constraints, and more
- + Increased opportunity for parallelism
  - ▶ objective, local solver, and global solver



